



**PCT****INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT099	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/IT 02/00716	International filing date (day/month/year) 11.11.2002	Priority date (day/month/year) 11.11.2002
International Patent Classification (IPC) or both national classification and IPC F16H29/08		
Applicant GASPARDO SEMINATRICI S.P.A. et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 6 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand  06.05.2004	Date of completion of this report  02.03.2005	
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Szodfridt, T  Telephone No. +49 89 2399-6929  	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IT 02/00716

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1, 3-9 as originally filed  
2 filed with telefax on 29.12.2004

**Claims, Numbers**

1-16 filed with telefax on 29.12.2004

**Drawings, Sheets**

1/6, 2/6, 4/6-6/6 as originally filed  
3/6 filed with telefax on 29.12.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	-
Inventive step (IS)	Yes: Claims	1-16
	No: Claims	-
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	-

2. Citations and explanations

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following documents:

D1: DE-A-844522

D2: DE-A-855030

D3: DE-A-3615819

**1. Novelty of independent claim 1**

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (the references in parentheses applying to this document):

a gearbox (page 2 line 35), particularly for transmission systems in devices for metering granular and/or materials in powder form, comprising a pair of shafts (A, G) that is, a drive-input shaft (A) and a drive-output shaft (G), respectively, there being provided on the drive-output shaft at least one pair of coaxial freewheels (page 2 line 54 to 55; page 3 line 6 to 7), on each of which an end of a respective linkage (C) carrying a movable fulcrum means (D) is active, the opposite end of each linkage being driven with a reciprocating oscillatory motion about the fulcrum means by an eccentric device (B) provided on the drive-input shaft in order to convert the reciprocating oscillatory motion into an intermittent rotary motion of each freewheel and consequently to bring about a rotary motion of the drive-output shaft in a preselected direction of rotation, the drive-input shaft comprising at least one pair of cranks (B and page 2 line 54 to 55) with eccentric pins and each linkage comprising a respective element (C) substantially similar to a connecting rod having a first end (I) connected kinematically to the corresponding freewheel and a second, opposite end (K) articulated on the respective pin of the crankshaft (Fig. 1) with a capability for rotary and translational movement relative to the pin (Fig.3), the movable fulcrum means comprising, for each connecting-rod element, a respective fulcrum pin (D), each fulcrum pin being movable, in adjustable manner, between the opposite ends of the connecting-rod element so as to define different lever arms between said ends (Figures 1 and 2) and consequently to adjust the transmission ratio between the drive-input shaft and the drive output-shaft

of the gearbox page 2 line 66 to 75).

The subject-matter of claim 1 differs from this known gearbox in document D1 in that each fulcrum pin has a first end restrained on a stationary structure of the gearbox and an opposite second end restrained on the corresponding connecting-rod element to constitute the centre of the rotation of said connecting rod element during the reciprocating oscillatory motion relative to the driver-input shaft, said first end of the fulcrum pin being guided slidably in a wall of a casing constituting the gearbox housing and the second end of said fulcrum pin being engaged rotatably and slidably in a seat formed in the corresponding connection-rod element.

The subject-matter of claim 1 is therefore considered to be new (Article 33(2) PCT).

## **2. Inventive step of independent claim 1**

The problem to be solved by the present invention may therefore be regarded as how to accommodate the fulcrum pin in the gearbox housing.

The solution in claim 1 is not contained in or does not seem to be rendered obvious from the state of the art as mentioned in the search report.

The present claim 1 seems therefore to fulfil the provisions of Art 33 (3) PCT.

## **3. Industrial applicability**

The application seems to fulfil the provisions of Art. 33 (4) PCT, because the corresponding gearbox can be produced and used at least in the transmission industry.

## **4. Dependent claims 2 to 16**

The subject-matter of dependent claims 2 to 16 have as subject-matter special embodiments of the invention according to claim 1 and seem to fulfil the requirements of Article 33(2) to (4) PCT.

## **5. Remarks**

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The application does not meet the requirements of Rule 5.1(iii) PCT because the advantageous effects of the invention with reference to the background art are not stated in the description.

Each of the freewheels is acted on by the end of a linkage with a movable fulcrum; the opposite end of the linkage is driven with a reciprocating motion by contact with a respective cam keyed to the input shaft of the gearbox. The eccentricity of the cams and their relative offset are such as to convert the reciprocating motion of the linkages into an intermittent rotary motion of the freewheels so as to rotate the output shaft with a preselected direction of rotation and at a predetermined speed. Adjustment of the position of the movable fulcrum, which is disposed in a position between opposite ends of the linkage, determines the preselected transmission ratio between the input shaft and the output shaft of the gearbox. A gearbox having the features outlined above is known from DE 844522. Moreover, a spring with a resilient biasing function is provided to return each freewheel to the initial position after each half turn of the input shaft (the cams are typically offset by 180°). An example of a gearbox devised for applications in metering devices of sowing machines is known from DE 3615819.

#### Description of the invention

A main object of the present invention is to provide a gearbox for applications of the above-mentioned type in which the rotary motion of the gearbox output shaft, which is subjected to the intermittent and reciprocating motion of each of the freewheels keyed thereto, is rendered more uniform.

Another object is to render the operation of the transmission members of the gearbox independent of any resilient biasing means of the type provided in known solutions, so that the stresses acting on these members are substantially uniform at the respective rates of rotation, and are independent of the position in which the gearbox is mounted.

These objects and yet others which will be pointed out below are achieved by the invention by means of a gearbox formed in accordance with the appended claims.

JC14 Rec 1 CT/PTO 06 MAY 2005

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## CLAIMS

1. A gearbox, particularly for transmission systems in devices (2) for metering granular and/or materials in powder form, comprising a pair of shafts, that is, a drive-input shaft (5) and a drive-output shaft (6), respectively, there being  
5 provided on the drive-output shaft (6) at least one pair of coaxial freewheels (8), on each of which an end of a respective linkage (10) carrying a movable fulcrum means is active, the opposite end of each linkage being driven with a reciprocating oscillatory motion about the fulcrum means by an eccentric device provided on the drive-input shaft (5) in order to convert the  
10 reciprocating oscillatory motion into an intermittent rotary motion of each freewheel (8) and consequently to bring about a rotary motion of the drive-output shaft (6) in a preselected direction of rotation, the drive-input shaft (5) comprising at least one pair of cranks with eccentric pins (11) and each linkage (10) comprising a respective element (13) substantially similar to a  
15 connecting rod having a first end (13a) connected kinematically to the corresponding freewheel (8) and a second, opposite end (13b) articulated on the respective pin (11) of the crankshaft (5) with a capability for rotary and translational movement relative to the pin (11), the movable fulcrum means comprising, for each connecting-rod element (13), a respective fulcrum pin  
20 (18), each fulcrum pin (18) being movable, in adjustable manner, between the opposite ends (13a, 13b) of the connecting-rod element (13) so as to define different lever arms (B1, B2) between said ends and consequently to adjust the transmission ratio between the drive-input shaft (5) and the drive output-shaft (6) of the gearbox, characterized in that each fulcrum pin (18) has a  
25 first end (18a) restrained on a stationary structure of the gearbox and an opposite second end (18b) restrained on the corresponding connecting-rod element (13) to constitute the centre of the rotation of said connecting rod



element during the reciprocating oscillatory motion relative to the drive-input shaft, said first end (18a) of the fulcrum pin (18) being guided slidably in a wall of a casing constituting the gearbox housing (3) and the second end (18b) of said fulcrum pin being engaged rotatably and slidably in a seat (21) formed in the corresponding connecting-rod element (13).

2. A gearbox according to Claim 1 in which guide means are provided on each of the connecting-rod elements (13) for guiding the second connecting-rod end (13b) on the respective pin (11) of the crankshaft (5) during the eccentric rotary motion of the pins (11) relative to the axis of rotation (X) of the drive-input shaft (5).

3. A gearbox according to Claim 2 in which the guide means comprise, on each connecting-rod element (13), a respective elongate slot-like portion (16) which can be engaged slidably by the corresponding pin (11).

4. A gearbox according to Claim 3 in which the slot-like portion (16) is elongate in a direction transverse the axis of rotation (X) of the drive-input shaft (5) of the gearbox.

5. A gearbox according to Claim 3 or Claim 4 in which the slot-like portion (16) is open at the second end (13b) of the connecting-rod element (13).

6. A gearbox according to Claim 5 in which the open slot-like portion (16) is defined by a pair of opposed, parallel and spaced-apart walls (16a, 16b) between which the corresponding pin (11) of the drive-input crankshaft (5) is guided slidably.

7. A gearbox according to Claim 6 in which at least one sliding block (17) is interposed between the walls (16a, 16b) of the slot (16) and the pin (11), the sliding block (17) having a first surface (17a) and a second surface (17b) which are in sliding contact with the walls of the slot (16) and with the pin (11), respectively.

8. A gearbox according to one or more of the preceding claims in which the eccentric pins (11) provided in the cranks of the drive-input shaft (5) are offset by 180° relative to the axis of rotation (X) of the shaft (5).

9. A gearbox according to one or more of the preceding claims in which each of the freewheels (8) comprises an inner ring (8a) keyed to the drive-output shaft and an outer ring (8b) coaxial therewith and capable of rotating freely or with torque transmission, depending on the direction of relative rotation of the rings, each connecting-rod element (13) being articulated, at the first end (13a), to a collar portion (9) fitted on the outer ring (8b) and fixed for rotation therewith.

10. A gearbox according to Claim 1 in which the second end (18b) of the fulcrum pin is guided in the seat (21) with the interposition of a sliding block (21a) engaged slidably in the seat (21) and coupled rotatably with the pin (11).

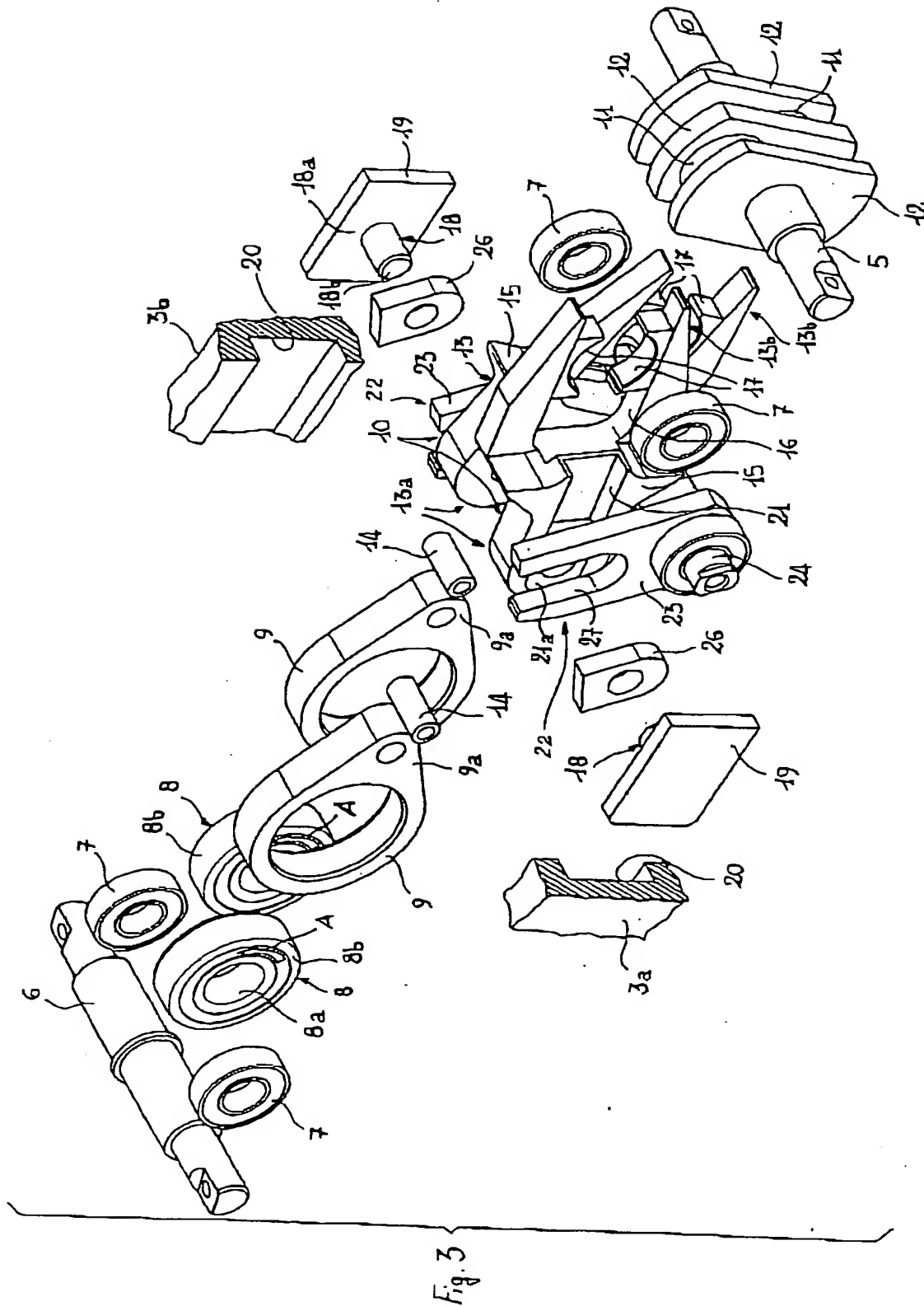
11. A gearbox according to Claim 1 or Claim 10 in which the seat (21) extends from the first end (13a) of the connecting rod towards the second, opposite end (13b) of the connecting rod.

12. A gearbox according to one or more of Claims 1, 10 and 11 in which actuator means are provided and are active on the fulcrum pins (18) in order to move the position of the fulcrum relative to the connecting rod in an adjustable manner correlated with the preselected transmission ratio between the drive-input shaft (5) and the drive-output shaft (6) of the gearbox.

13. A gearbox according to Claim 12 in which the actuator means comprise, for each fulcrum pin (18), a lever mechanism (23) a free end of which is fixed for rotation with a control shaft (24) and which is articulated on the fulcrum pin (18) with a capability for rotary/translational movement between the fulcrum pin (18) and the lever mechanism (23).

14. A gearbox according to Claim 13 in which each fulcrum pin (18) is restrained on the respective lever mechanism (23) with the interposition of a sliding block (26) engaged slidably in a seat (27) of the lever mechanism and coupled rotatably with the fulcrum pin (18).
- 5 15. A metering device for the metered delivery of granular and/or materials in powder form, particularly for machines for dispensing the said materials, comprising a gearbox formed in accordance with one or more of the preceding claims for controlling transmission to respective metering members.
- 10 16. An agricultural sowing machine comprising a metering device for the metered delivery of granular seed, formed in accordance with Claim 15.

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